

Message Text

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TO USLO PEKING IMMEDIATE

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E.O. 11652: N/A

TAGS: TPHY, CH

SUBJECT: CHINA EARTHQUAKE - PRELIMINARY ASSESSMENT

REF: PEKING 1460

1. THE OFFICE OF EARTHQUAKE STUDIES OF THE US GEOLOGICAL SURVEY HAS INFORMALLY PROVIDED THE FOLLOWING PRELIMINARY ASSESSMENT OF THE DANGER OF A LARGE AFTERSHOCK FOLLOWING THE TANGSHAN EARTHQUAKE.

BEGIN TEXT:

THE WARNING BY CHINESE SCIENTISTS THAT A LARGE AFTERSHOCK IS EXPECTED IN THE PEKING AREA AND THAT PRECAUTIONS SHOULD BE TAKEN SEEMS REASONABLE. THIS CONCLUSION CAN BE DRAWN SOLELY FROM THE KNOWLEDGE OF THE NATURE OF THE AFTERSHOCK SEQUENCES. INFORMATION ABOUT THE EXACT LOCATION OF THE CURRENT AFTERSHOCK ACTIVITY AND ABOUT GEOPHYSICAL ANOMALIES THAT COULD BE EARTHQUAKE PRECURSORS (THE CHINESE SCIENCE-
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TISTS CERTAINLY HAVE THE FORMER AND COULD HAVE THE LATTER)

WOULD PROVIDE AN EVEN FIRMER BASIS FOR THE WARNING.

CHARACTERISTICS OF AFTERSHOCKS

AFTERSHOCK SEQUENCES HAVE BEEN THE SUBJECT OF MANY STUDIES. THEIR PROPERTIES ARE WELL-KNOWN AND REMARKABLY REGULAR.

1. DECAY WITH TIME IN RATE OF OCCURRENCE. THE FREQUENCY OF OCCURRENCE OF AFTERSHOCKS, E.G., THE NUMBER OF AFTERSHOCKS ABOVE MAGNITUDE 3, SAY PER DAY, DECREASES PROPORTIONALLY TO THE TIME AFTER THE MAIN SHOCK. TO ILLUSTRATE THIS POINT, THE NUMBER OF SHOCKS PER DAY OCCURRING ON THE TENTH DAY AFTER THE MAIN SHOCK WILL BE TWICE THAT ON THE TWENTIETH DAY, TRIPLE THAT ON THE THIRTIETH DAY, ETC. THE RISK, THEREFORE, USUALLY DECREASES STEADILY WITH TIME, BUT PERSISTS FOR A LONG TIME AFTER A GREAT EARTHQUAKE.

2. MAGNITUDE DISTRIBUTION. A HISTOGRAM OF THE EARTHQUAKE MAGNITUDES IN AN EARTHQUAKE SEQUENCE INVARIABLY SHOWS THAT FOR EVERY EARTHQUAKE IN A CERTAIN MAGNITUDE RANGE, THERE WILL BE ABOUT TEN EARTHQUAKES IN THE RANGE ONE MAGNITUDE UNIT LOWER. FOR EXAMPLE, IF THERE IS ONE SHOCK BETWEEN MAGNITUDES 7 AND 8, THERE WILL PROBABLY BE TEN EARTHQUAKES BETWEEN MAGNITUDES SIX AND SEVEN, 100 BETWEEN 5 AND 6, ETC.

3. LOCATION OF AFTERSHOCKS WITH RESPECT TO THE MAIN SHOCK. A LARGE EARTHQUAKE PARTIALLY RELIEVES THE STRESS ON A SEGMENT OF A FAULT, BUT CONCENTRATES STRESS ON THE ENDS OF THE BROKEN SEGMENT. AFTERSHOCKS, THEREFORE, OFTEN CLUSTER ON THE ENDS OF THE MAIN FAULT BREAK AND THEN SPREAD AWAY FROM THE BREAK AS THE STRESS IS REDISTRIBUTED. AFTERSHOCKS ALSO CAN CONTINUE TO OCCUR ALONG THE ORIGINAL BREAK OWING TO READJUSTMENT OF THE FAULT.

THE EARTHQUAKE OCCURRED IN A SEISMICALLY ACTIVE PART OF NORTHEAST CHINA. TWO MAJOR TRENDS OF TECTONIC ACTIVITY ARE PRESENT IN THE AREA. ONE TRENDS EAST-WEST ACROSS THE LIMITED OFFICIAL USE

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NORTHERN BOUNDARY OF THE NORTH CHINA PLAIN. THE OTHER TRENDS NORTH-EAST SOUTH-WEST ALONG THE COAST OF THE GULF OF CHIHLI. WHICH OF THESE TWO STRUCTURES THE EARTHQUAKE IS ASSOCIATED WITH IS NOT PRESENTLY KNOWN TO US. THE FORMER WOULD BE MORE THREATENING TO PEKING BECAUSE MIGRATION OF AFTERSHOCK ACTIVITY ALONG THE STRUCTURE COULD RESULT IN EARTHQUAKES NEARER THE CITY. END TEXT

2. THIS ASSESSMENT IS PROVIDED STRICTLY FOR YOUR INFORMATION ONLY. SCIENTISTS OF THE US GEOLOGICAL SURVEY HAVE EMPHASIZED THAT THEY DO NOT WISH IN ANY WAY TO APPEAR TO BE CONTRADICTING CONCLUSIONS OR ASSESSMENTS ARRIVED AT BY THE CHINESE BASED ON MUCH MORE EXTENSIVE DATA.
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